TWO BIVALVES FROM THE MIDDLE DEVONIAN BURDEKIN FORMATION, NORTH QUEENSLAND

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The bivalves *Phenacocyclas pohli* LaRocque and *Modiomorpha mitchellae* sp.nov. are found within the Burdekin Formation, to the north of Charters Towers, north Queensland. They represent respectively the first lucinid and modiomorph described from these strata. *M. mitchellae* sp.nov. is characterised by its large size and elongate shape. □ *Mollusca, Bivalvia, Lucinidae, fossil, Phenacocyclas, Modiomorpha mitchellae, new species, Queensland, Middle Devonian, Burdekin Formation.*

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Collections of molluscs from the Middle Devonian (Givetian) Burdekin Formation have yielded two bivalve genera previously unreported from this formation, *Phenacocyclas pohli* LaRocque and *Modiomorpha mitchellae* sp.nov.

Stratigraphic nomenclature for the area is outlined in Wyatt & Jell (1980) and Lang et al. (1990). The Fanning River Group is divided into three formations— the Big Bend Arkose, mostly coarse grained siliciclastics is overlain by the Burdekin Formation, a dominantly limestone sequence, which in turn is overlain by the Cultivation Gully Formation, a predominantly siliciclastic unit. In the Burdekin Downs area (Fig. 1), the location of *Phenacocyclas pohli* LaRocque, the Burdekin Formation is about 90m thick and the Cultivation Gully Formation has been eroded. In the Paynes Lagoon area (Fig. 1), the locality of *Modiomorpha mitchellae* sp.nov., the only manifestation of the Burdekin Formation is a 2 to 5m thick molluscan shell bed that rests unconformably on Precambrian Basement.

In previous investigations of the molluscan fauna, Etheridge (1917) described a single gastropod from the Group and Heidecker (1959) described three gastropods and the two bivalve taxa from the Big Bend area: *Tanaodon louderbacki* Kirk and *Neoactinodonta amygdalina* Heidecker. Both Heidecker's species have been reassigned to *Tanaodon louderbacki* Kirk by Pojeta, Zhang & Yang (1986). Zhen (1990) reviewed the gastropod biofacies found at the base of the Fanning River Group, but did no further taxonomic investigations of the molluscan fauna. Cook (in press) describes a fourth genus of gastropod from the Big Bend Arkose and lower Burdekin Formation.

The Burdekin Formation has been assigned a late Eifelian to Givetian age based on limited conodont data, rugose coral associations, and the presence, in abundance, of *Stringocephalus* sp. No precise zonal ages for the localities given in this work are available but the coral fauna associated with both molluses suggests a Givetian age (Zhen, 1990).

SYSTEMATIC PALAEONTOLOGY

Phylum MOLLUSCA
Class BIVALVIA Linné, 1758
Subclass HETERODONTA Neumayr, 1884
Order VENEROIDEA Adams and Adams, 1856
Superfamily LUCINICOIDEA Fleming, 1828
Family LUCINIDAE Fleming, 1828

Phenacocyclas LaRocque, 1950

TYPE SPECIES

Phenacocyclas pohli LaRocque by original designation from the Middle Devonian of Michigan.

DIAGNOSIS

Equivalved, irregularly rhomboidal lucinoideans with a prominent posterodorsal radial sulcus, slight anteroventral embayment and comarginal ornament. Hinge is straight and short with small umbones, narrow escutcheon and small lunule. Internal molds with posteroventral notch, two large elongate adductor scars and prominent irregular sigmoidal grooves. Posterior adductor deeper and narrower than anterior scar. Dentition small and poorly known: one probable small lateral tooth and probable small cardinal tooth.

REMARKS

Phenacocyclas, according to LaRocque (1950) is separated from *Paracyclas* Hall by the posterodorsal sulcus, the arrangement of the adductors, the presence of a strong posteroventral notch and

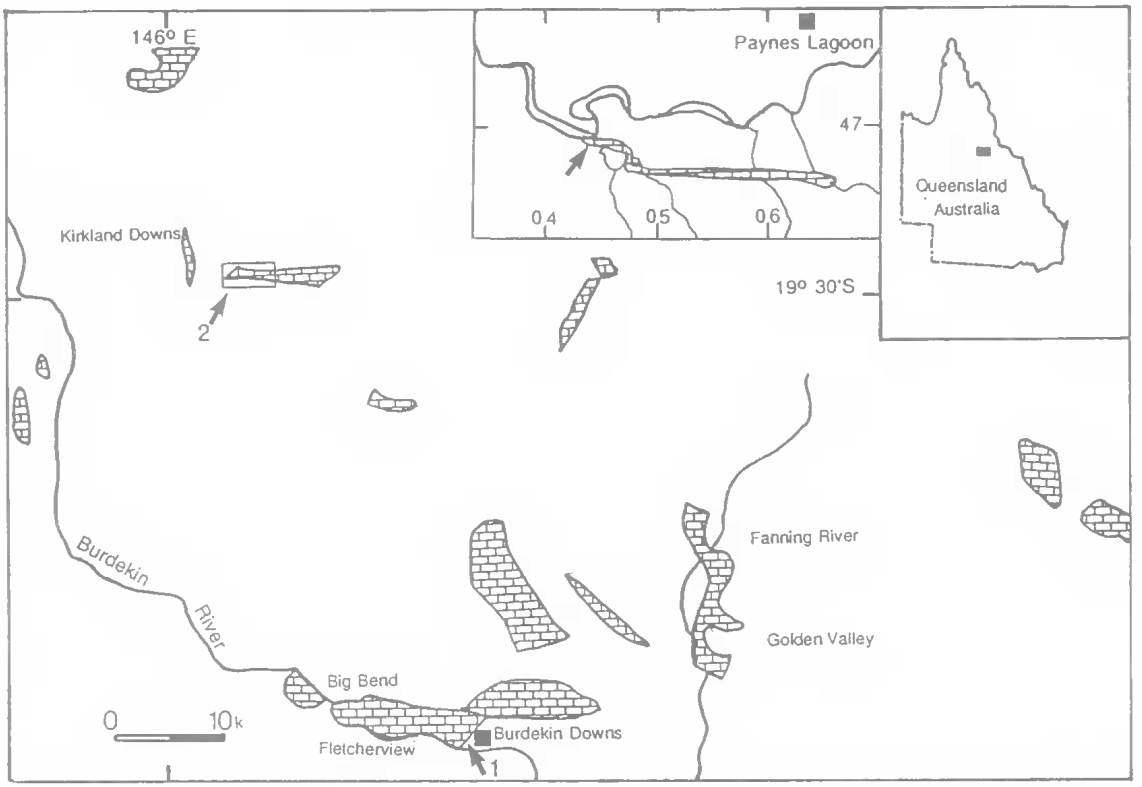

FIG. 1. Outcrop pattern for the Fanning River group within the Townsville Hinterland, showing collection localities (arrows) for *Phenacocylcas pohli* LaRocque (1) and *Modiomorpha mitchellae* sp.nov. (2).

the sigmoidal grooves on internal molds. It differs from *Crassatellopsis* Beushausen and *Montanaria* Spriestersbach on the basis of size of the dentition. The genus has been placed in the Lucinidae by Chavan (1969).

Phenacocyclas pohli LaRocque
(Fig. 2)

Material Examined

Nine conjoined specimens with shell intact and mostly free from host lithology of impure carbonate wackestone. Only 6 of the specimens are sufficiently complete to provide size data (Table 1). Material housed in Queensland Museum: QMF 22528, QMF 22529: James Cook University JCUF 11806-11812.

Age and Occurrence

Present Study: Middle Devonian (Givetian) Burdekin Formation, Fanning River Group. Collected from hill directly behind Burdekin Downs Homestead, NW of Charters Towers, north Queensland. Grid Reference Dotswood: DU 199 011. Middle Devonian Dundee Limestone and Rodgers City Limestone, Michigan, U.S.A.

Description

Medium to large equivalved rhomboidal shells ranging in height from 35-55mm, in length 42-56mm and width 19-25mm. Strong posterodorsal sulcus present. Slight embayment on the anteroventral margin. Thin shelled, with well developed comarginal ornament consisting of fine growth lines overprinted by coarser irregularly spaced rugations. Hinge and internal structures not seen.

Remarks

Burdekin material is only slightly larger than the type material illustrated by LaRocque (1950)

TABLE 1. Morphometric data for specimens of *Phenacocyclas pohli* from the Burdekin Formation. Measurements in mm.

SPECIMEN	HEIGHT	LENGTH	WIDTH
QMF 22528	43	46	24
QMF 22529	39	44	19
JCUF 11806	55	57	25
JCUF 11807	54	56	24
JCUF 11808	46	42	19
JCUF 11810	45	44	19

FIG. 2. a-c. *Phenacocyclas pohli* LaRocque JCUF 11806: a, right valve ×0.9; b, left valve ×0.9; c, dorsal view ×1.

and shows all of the external features described for *Phenacocyclas pohli*. Unfortunately the illustrated adult specimens are restricted to internal molds but juvenile material (LaRocque, 1950 pl. 15, figs 1-7) shows features found also in the Burdekin specimens.

Both LaRocque (1950) and Bailey (1983) suggested that *Paracyclas antiqua* (Goldfuss) may belong to *Phenacocyclas*. In particular *Paracyclas antiqua* (Goldfuss) of Beushausen (1895) shows many of the features of *Phenacocyclas*. The size of Beushausen's (1895) specimens, as given by Bailey (1983) is similar to that of *Phenacocyclas pohli* LaRocque. It is possible that the two are synonymous but determination of this awaits detailed examination of type material of *Paracyclas antiqua* (Goldfuss).

Subclass PALAEOHETERODONTA
Newell, 1965
Order MODIOMORPHOIDA Newell, 1969
Superfamily MODIOMORPHACEA
Miller, 1877
Family MODIOMORPHIDAE Miller, 1877

Modiomorpha Hall & Whitfield, 1869

TYPE SPECIES

Modiomorpha concentrica (Conrad, 1838)

DIAGNOSIS

Modioliform modiomorphids with large wedge-shaped cardinal tooth in left valve, socket in right valve, weak laterals, rugose growth increments.

Modiomorpha mitchellae sp.nov.
(Fig. 3)

MATERIAL EXAMINED

HOLOTYPE: JCUF 11823; internal mold.

PARATYPES: QMF 22684-85: well preserved internal molds, JCUF 11824-28, QMF 22686, 22687.

OCCURRENCE

Middle Devonian (Givetian), north Queensland Australia. Burdekin Formation, Paynes Lagoon Station, 80km W of Townsville

DIAGNOSIS

Very large, elongate *Modiomorpha* with medium to coarse comarginal ornament.

DESCRIPTION

Large posteriorly elongate shells, modioliform in outline, up to 150mm long. Shell thick, especially anterodorsally, thinning posteroventrally. A break in shell slope, which runs from anterodorsal margin to posteroventral margin on the internal mold, is a weak ridge. Medium to coarse comarginal ornament preserved on JCUF 11824. Invagination along the hinge indicates large cardinal tooth and socket. Hinge plates relatively thick. Anterior adductor scar is small, subcircular. Quick and catch portions are easily discernible. Dorsally adjacent retractor scar is much smaller, subcircular. Posterior scar not preserved.

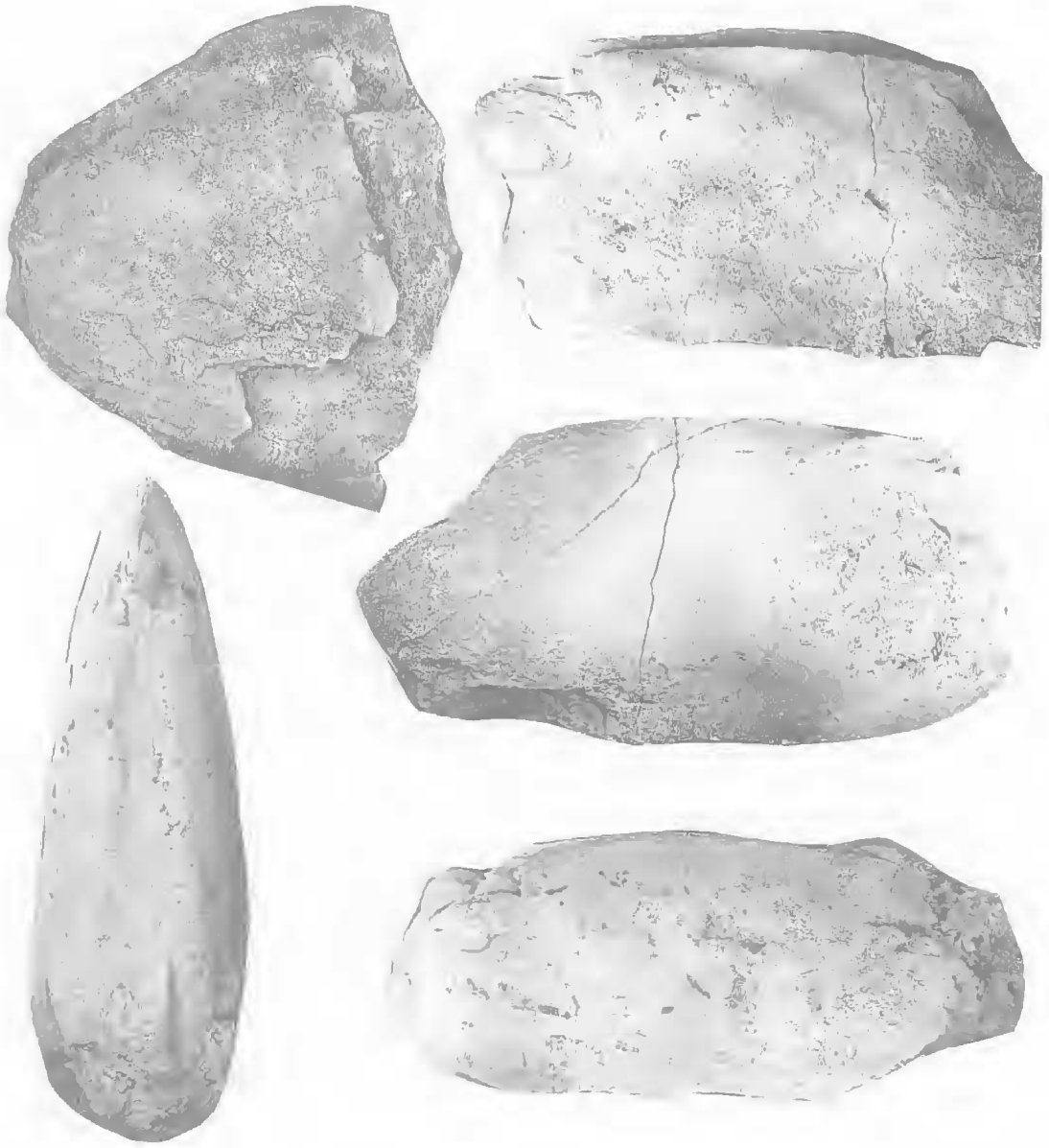

FIG. 3. a-c *Modiomorpha mitchellae* sp.nov: a, Paratype JCUF 11824, external of partial right valve, showing concentric ornament × 1.1; b, Holotype JCUF 11823, internal mold left valve × 1; c, Holotype JCUF 11823, internal mold right valve × 1; d, Paratype QMF 22684, dorsal view of articulated internal mold, showing invagination indicating large cardinal tooth × 1; e, Paratype QMF 22684, internal mold left valve, showing prominent anterior adductor × 1.

REMARKS

The characteristic musculature, dentition, shape and size ally the material to the genus *Modiomorpha*. It is distinguished by its size and rather elongate shape from other species of *Modiomorpha*. *M. concentrica* (Conrad) described by Bailey (1983), Pojeta, Zhang & Yang (1986) and *M. oblonga* Zhang 1977 are smaller despite Pojeta, Zhang & Yang's (1986) comment that *M. oblonga* is of large size. *M. herculi* Bradshaw 1991 (in Bradshaw & McCartin, 1991) is substantially smaller. *M. mytiloides* (Conrad, 1841; in Bailey, 1983) is also a small form. There is some disagreement concerning the systematic

position of *Modiomorpha* Hall & Whitfield. Newell's (1965) scheme is followed here, but Pojeta, Zhang & Yang (1986) express a different view.

ETYMOLOGY

Named for R. L. Mitchell for her contributions to the study of modern mollusca from the Townsville area.

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